

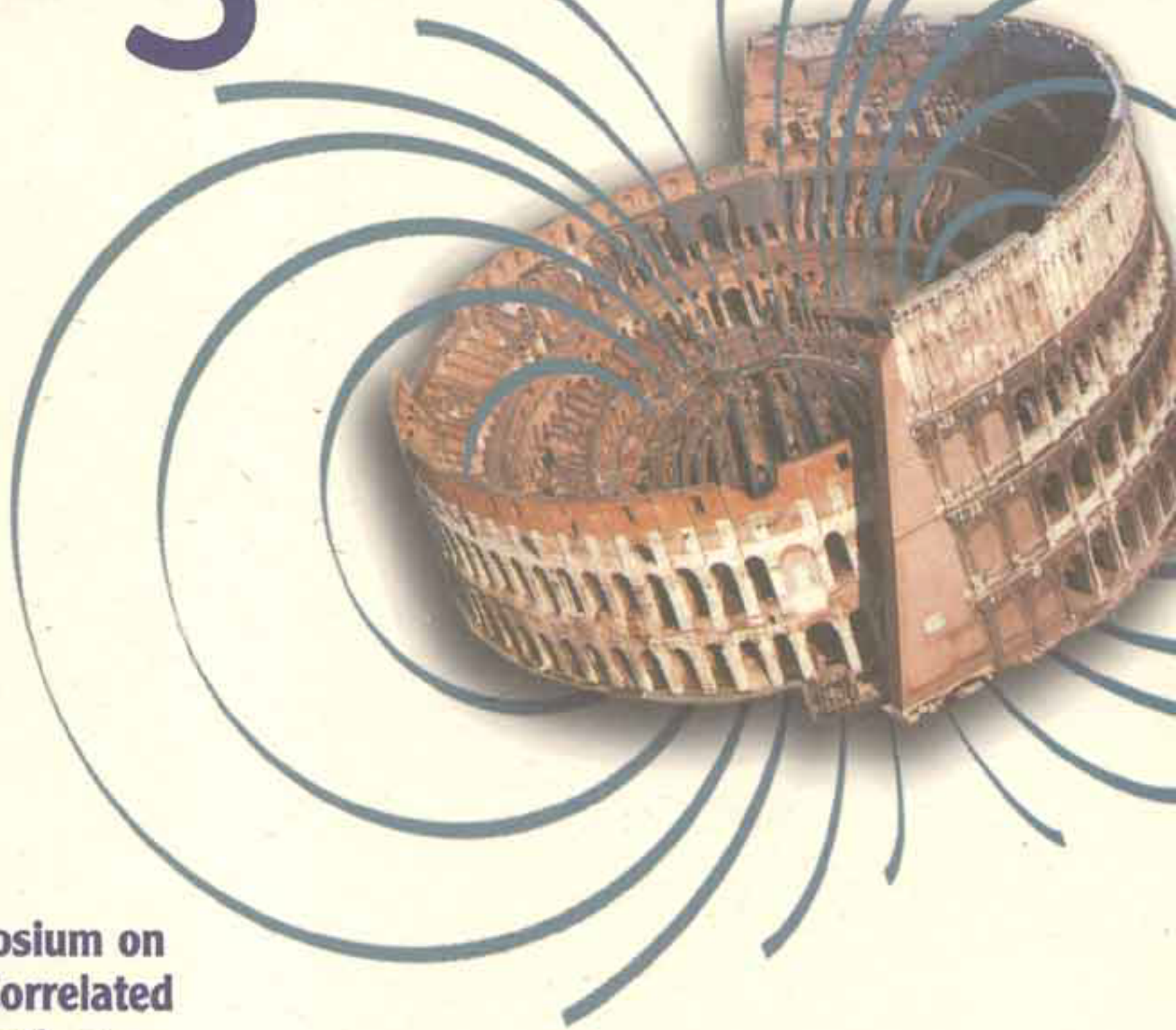
ICM 2003

ROMA, Italy • July 27 – August 1 • 2003

international  
conference

on

# Magnetism



Incorporating

**The Symposium on  
Strongly Correlated  
Electron Systems**

## abstracts

## 5V-pm-32——MÖSSBAUER STUDIES OF $\text{BaFe}_{11}\text{Al}_1\text{O}_{19}$ BY A WET CHEMICAL PROCESS

Dong Hyeok Choi<sup>1</sup>, Sung Yong An<sup>2</sup>, In-Bo Shim, and Chul Sung Kim

<sup>1</sup>Dept. of Physics, Kookmin University, Seoul 137-702, Korea; <sup>2</sup>Dept. of Physics, Colorado State University, Ft. Collins CO 80823 USA

$\text{BaFe}_{11}\text{Al}_1\text{O}_{19}$  powders were prepared by a wet chemical process. Magnetic and structural properties of the powders were characterized with an X-ray diffractometer(XRD), a vibrating sample magnetometer (VSM), and Mössbauer spectroscopy. X-ray diffraction measurements showed that the  $\text{BaFe}_{11}\text{Al}_1\text{O}_{19}$  had a M-type hexagonal structure and lattice constants is decreased from  $a_0=5.901 \text{ \AA}$  and  $c_0=23.243 \text{ \AA}$  to  $a_0=5.870 \text{ \AA}$  and  $c_0=23.190 \text{ \AA}$ , as compared with  $\text{BaFe}_{12}\text{O}_{19}$ , which could be understood of Vegard's law. When one substitute  $\text{Fe}^{3+}$  ions for  $\text{Al}^{3+}$  ions, the saturation magnetization ( $M_s$ ) is decreased to 44.3 emu/g and coercivity ( $H_c$ ) is increased to 7562 Oe rapidly at room temperature under an applied field of 15 kOe. Mössbauer spectroscopy was performed at various temperatures ranging from 15 to 800 K, and was fitted with five subspectra of Fe sites in the structure ( $4f_1$ ,  $2a$ ,  $4f_2$ ,  $12k$ , and  $2b$ ) and Curie temperature ( $T_c$ ) determined  $700 \pm 5 \text{ K}$ . With substituted  $\text{Al}^{3+}$ , hyperfine field is decreased and the  $2b$  site had a very large quadrupole splitting. The isomer shifts indicate that the valence state of Fe ions is ferric ( $\text{Fe}^{3+}$ ).